Environment Canada Environnement Canada

Canada

A LIFE CYCLE APPROACH TO MANAGING ELECTRICAL & ELECTRONIC EQUIPMENT (EEE) IN CANADA

NA CEC Workshop on Spent Lead Acid Batteries & Electronics

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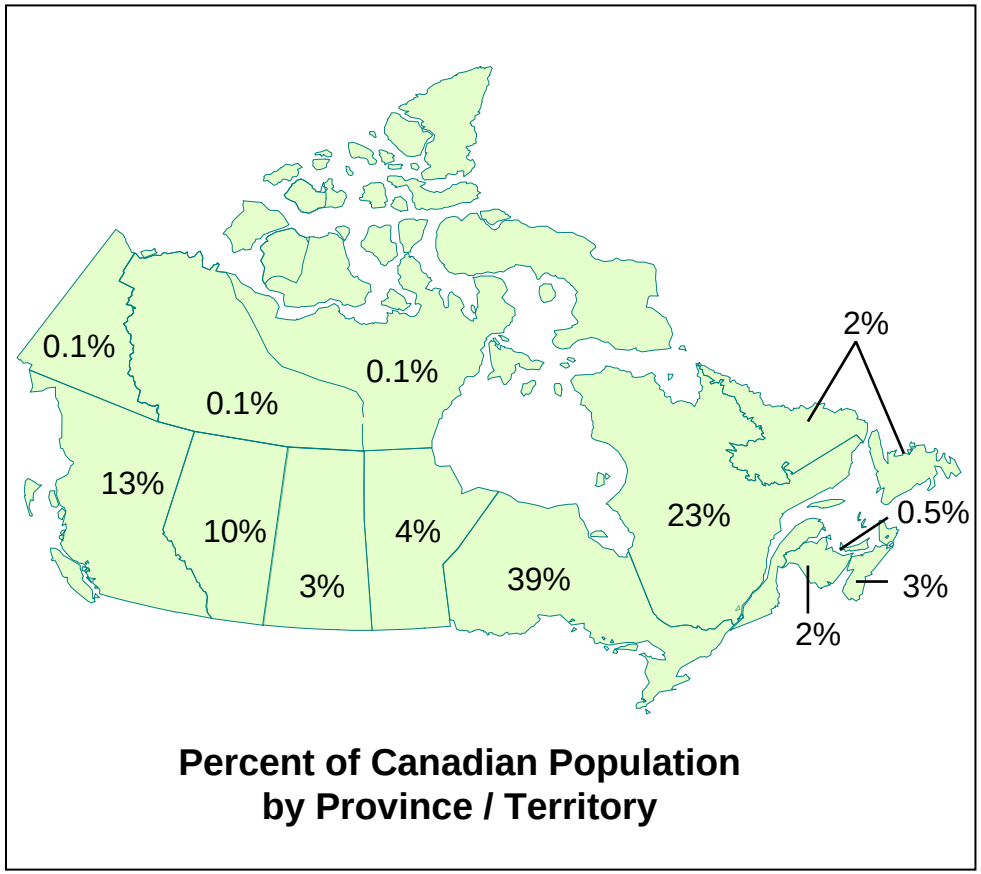
Overview

- E-waste Generated in Canada
- Hazardous Properties of E-waste
- Canada's Approach to Managing E-waste
  - Federal
  - Provincial
- Canadian Electronics Industry Contributions
- Observations & Lessons Learned

Canada is a big country with a relatively small population…

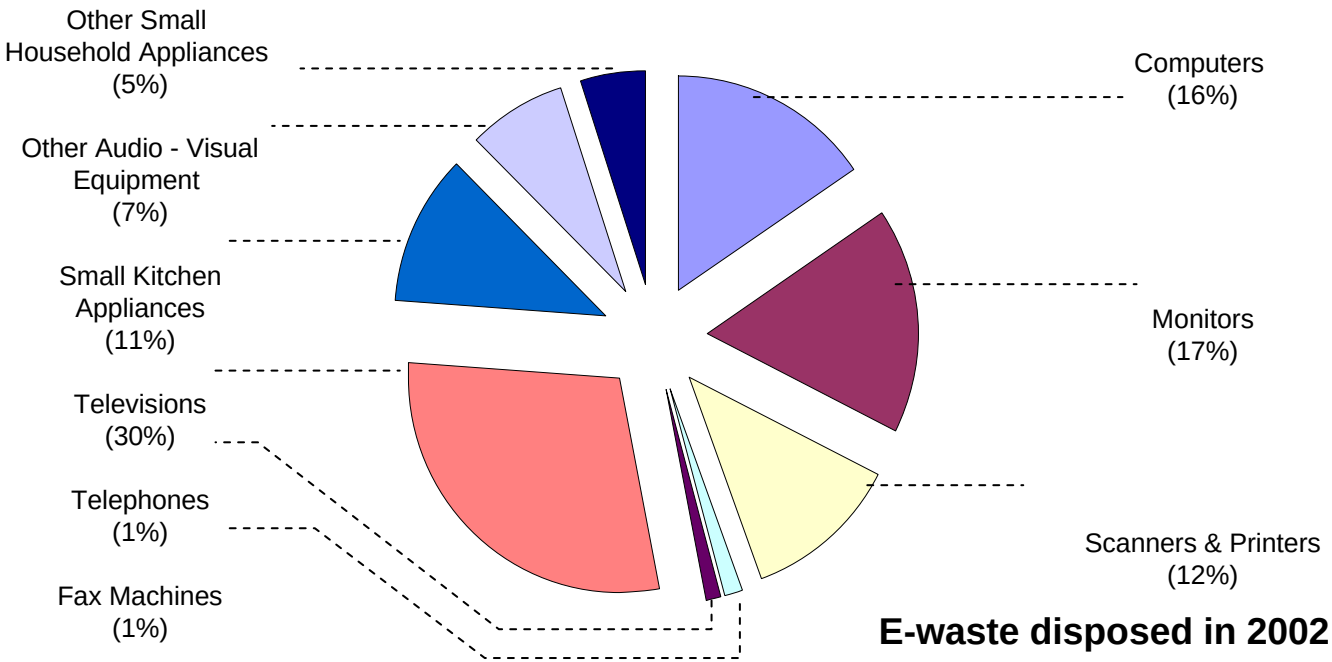


Percent of Canadian Population by Province / Territory

- Land area = ~ 9 million km^2
  - 10 provinces, 3 territories
- Population = ~ 32 million (2006)
  - 85% located in four provinces:
    - Ontario
    - Quebec
    - British Columbia
    - Alberta

…but we generate significant quantities of e-waste

- Environment Canada baseline studies (2000 - 2003)
- E-waste disposed = 158,000 tonnes (2002), or 5 kg per capita
- E-waste recycled = 9,000 tonnes (2002), or 5% of all e-waste
- Less than 1% of solid waste generated in Canada is e-waste



E-waste disposed in 2002 (% by weight)

Manufacture & disposal of e-waste may also have climate change impacts…

- Manufacture of a single computer consumes:
  - 240 kg of fossil fuel
  - 22 kg of chemicals
  - 1,500 kg of water

United Nations University, *Computers & the Environment* (2003)

- Carbon dioxide (CO_2) emissions for computer waste:
  - Landfilling = net release of 0.01 tonnes of eCO_2 / tonne
  - Incinerating = net release of 0.41 tonnes of eCO_2 / tonne
  - Recycling = net savings of 1.60 tonnes of eCO_2 / tonne

EC & NRCan, *Determination of the Impact of Waste Management Activities on Greenhouse Gases* (2005)

  - Figures consider emissions from processing, tansport & landfilling
    - Canada could save 88,000 tonnes of eCO_2 / year by recycling all PCs

…& e-waste may contain hazardous & toxic constituents

- In 2002, personal computers disposed of in Canada (i.e. 52 kt) contained:

Lead:	3,100 tonnes	(cathode ray tubes, solder, circuit boards, cables…)
Mercury:	1 tonne	(fluorescent tubes, switches …)
Chromium:	3 tonnes	(colour pigments, plastic stabilizers…)
Cadmium:	4.4 tonnes	(phosphorescent coatings, pigments, stabilizers…)
Nickel:	418 tonnes	(metal alloys…)
Plastics:	11,300 tonnes	(may contain brominated flame retardants & PVCs)
Beryllium:	7.9 tonnes	(copper alloys, contact springs…)

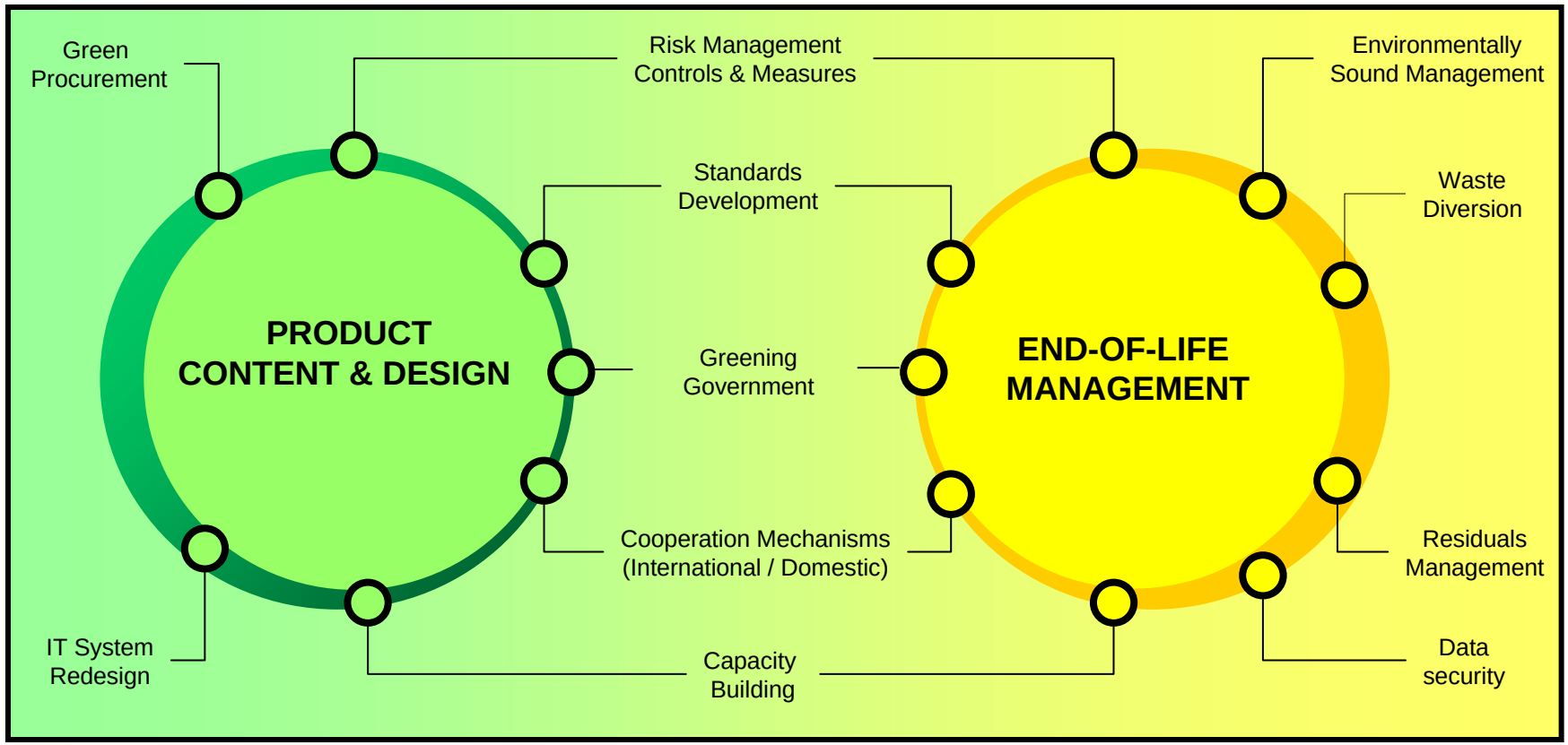
- In 2004, consumer batteries disposed in Canada (i.e. 11 kt) contained:

Lead:	766 tonnes	(small sealed lead acid batteries only)
Mercury:	0.4 tonne	(non-mercuric free zinc air batteries)
Cadmium:	235 tonnes	(nickel cadmium batteries)
Nickel:	386 tonnes	(nickel cadmium & nickel metal hydride batteries)

Managing solid wastes, including EEE, is a shared responsibility in Canada

- Federal government:
  - Regulates toxic substances & international / inter-provincial hazardous waste movements
  - Transcribes international agreements into national law (e.g. Basel Convention, OECD…)
  - Achieved through the *Canadian Environmental Protection Act* (CEPA 1999)
  - Environment Canada is the regulating authority
- Provincial & territorial government:
  - Regulates product stewardship & intra-provincial movements
  - Control & license intra-provincial waste generators, carriers & treatment facilities
- Municipal government:
  - Provinces convey authorities to municipalities
  - Oversee local waste management services (collection, recycling, disposal)
  - May impose local landfill bans
  - Providing direction on recycling & disposal to the general public

Canada is engaged in “front-end” & “back-end” activities of the EEE product life cycle…



Overview of Environment Canada's work at the "front-end" of the EEE product life cycle

- Green procurement & standards development
  - Eco-labelling is being used by Public Works to support greening government
    - Canadian Eco-logo criteria (third party certified) & US EPEAT criteria (industry self declaration)
  - Development of standards via International Electro-Technical Commission (IEC)
    - Environmental declaration; environmental conscious design; test methods for finished products
- Risk management measures
  - Baseline studies & other reports on EEE & batteries
  - Chemical Management Plan (announced Dec 2006)
    - Categorize & screen of 23,000 substances in domestic commerce in batches
    - 200 substances identified for priority action (over 50 may be linked to the EEE sector)
- Other cooperation mechanisms
  - NA CEC Clean Electronics Pollution Prevention Partnership
  - European Commission – Canada Regulatory Cooperation Roadmap
  - International Task Force on Sustainable Products (UK led working group)
    - part of UNEP Marrakech Process for Sustainable Consumption & Production
    - "product networks" being established to work on selected products including batteries, and TVs

Overview of Environment Canada's work at the "back-end" of the EEE product life cycle

- Environmentally sound management
  - Administration, enforcement & compro of federal waste regulations
  - Fostering Extended Producer Responsibility for EEE
    - National Steering Committee on Electronics Recycling (information sharing)
    - Canadian Council of Ministers of the Environment (principles & product list)
    - National EPR workshops
  - Supporting ESM standards development for reuse & recycling (OECD, domestic, internal)
  - Basel Convention Public-Private Partnerships (mobile phones, computers)
- Risk management measures
  - Polybrominated diphenyl ethers (PBDE)
  - Mercury-containing products (Compact fluorescent lamps, batteries)
  - Other priority substances to be identified by the Chemicals Management Plan process
- Waste diversion
  - Extending operational life of Departmental PC use before replacement
  - Examination of thin client models
  - Computers for Schools (CfS) management of federal surplus computers

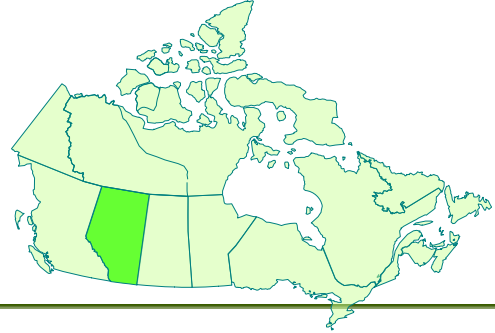
Canada-wide principles encourage consistencies in provincial programs…

- Canada-wide Principles for Electronic Product Stewardship
- Issued by Canadian Council of Ministers of the Environment (June 2004)

  - producer responsibility
  - general taxpayers do not bear program costs
  - minimize product life cycle impacts to human health & environment
  - environmentally sound & “4Rs” management
  - economically & logistically feasible management (strive for local benefits)
  - free & reasonable access to collection systems
  - education & awareness programs
  - consistent & equitable program design & implementation
  - strive for consistent product collection amongst adjacent jurisdictions
  - programs to include residential, commercial, historic & orphan products
  - transparency & reporting of program performance (including cost)
  - exports for recycling to facilities with ESM & fair labour practices

…& 5 provinces now have laws that designate e-waste for product stewardship…

Alberta



- 1st province to designate e-waste for product stewardship (May 2004)
  - *Electronics Designation Regulation*
  - *Designated Material Recycling & Management Regulation*
- Designated products include:
  1. Televisions & monitors
  2. Computers, laptops & accessories
  3. Printers
  4. Telephones, cell phones & wireless devices
  5. Fax machines & scanners
  6. Audio-video playback/recording & gaming equipment
- Collection began in Oct 2004 (items 1 - 3 only)
  - Operated by not-for-profit Alberta Recycling Management Authority (ARMA)
  - Suppliers must register with & remit product levies to ARMA
  - Product levies typically recouped from consumers (range from $5 - $45 CDN)
  - Levies used to finance registered collection & recycling services
    - $100 / tonne to municipal collectors
    - $50 - $200 / tonne to transporters
    - $700 / tonne to processors
- No charge to return e-waste at over 220 depots (mainly municipal)
  - Over 15,000 tonnes of e-waste recycled since program inception

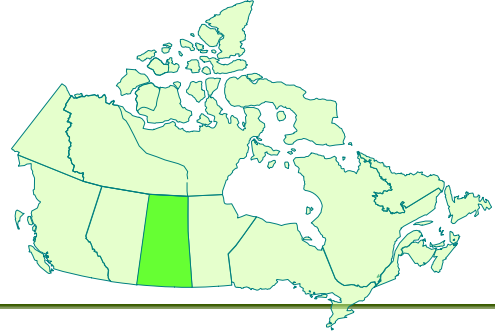
Ontario

- 2nd province to designate e-waste for product stewardship (Dec 2004)
  - *Waste Electrical & Electronic Equipment (WEEE) Regulation*
- Approximately 200 products have been designated, including:

1. Household appliances (49 listed)
2. Information technology equipment (28 listed)
3. Telecommunications equipment (24 listed)
4. Audio-visual equipment (22 listed)
5. Toys & leisure & sports equipment (11 listed)
6. Electrical & electronic tools (32 listed)
7. Navigational, measuring, monitoring, medical & control instruments (36 listed)

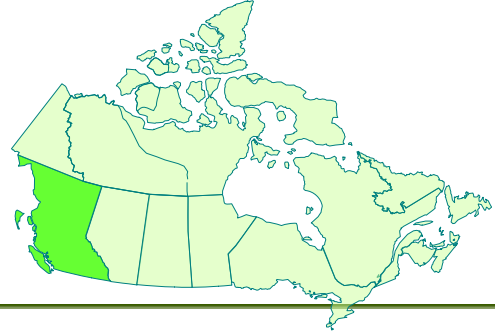
- Waste Diversion Organization (WDO) tasked with program development
  - Minister issued designation letter (Dec 2004) with priority on residential WEEE (items 1 – 4)
  - Brandowners & first importers/assemblers will assume responsibilities
  - Waste electrical & electronic equipment study completed (Jul 2005)
    - 259,000 tonnes of EEE (items 1 - 4) sold in 2004
  - Consultation plan developed (Feb 2005)
  - Minister issued final program request letter in June 2007, supporting phased implementation
  - Ontario Electronic Stewardship appointed as the Industry Funding Organization (Oct 2007)
  - Industry stewardship plan due Feb 2008
  - Program implementation due 1 year after Minister approves industry stewardship plan

Saskatchewan



- 3rd province to designate e-waste for product stewardship (Feb 2006)
  - *Waste Electronic Equipment Regulations*
- Designated products include:
  1. Televisions & monitors
  2. Computers, laptops & accessories
  3. Printers
- Collection began in Feb 2007
  - First sellers must implement an approved program to manage e-waste
  - Overseen by Saskatchewan Waste Electronic Equipment Program (SWEEP)
  - Product Care Association manages program logistics (paint experience)
  - Partnered with SARCAN Recycling to collect & recycle e-waste
  - Collection at over 70 SARCAN bottle depots
  - 1 M kg e-waste diverted over an 8 month period
  - Two processing plants dismantle products into material streams
  - Product levies are consistent with Alberta (i.e. $5 - $45 CDN)

British Columbia



- 4th province to designate e-waste for product stewardship (Feb 2006)
  - *Recycling Regulation* (as amended)
- Designated products include:
  1. Televisions & monitors
  2. Computers, laptops & accessories
  3. Printers
- Collection began in Aug 2007
  - Sellers must implement an approved program to manage e-waste
  - Two different not-for-profit organizations oversee industry collective programs
    - Electronics Stewardship of British Columbia (ESABC) – focus on recycling
    - Western Canada Computer Industry Association (WCCIA) – focus on reuse
  - Encorp Pacific will manage program logistics for ESABC (bottle experience)
  - Collection at bottle & “return-it” depots, institutions & round-up events
  - 70 collection sites across province (Salvation Army has also partnered as a collector)
  - Expect to divert over 10 M kg of e-waste from final disposal during year 1 of the program
  - Product levies are consistent with Alberta (i.e. $5 - $45 CDN)

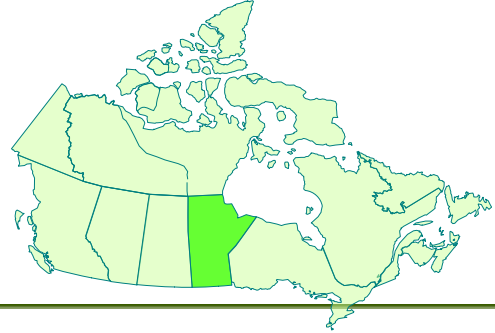
Nova Scotia

- 5th province to designate e-waste for product stewardship (Feb 2007)
  - *Solid Waste Resource Management Regulations* (as amended)
- Designated products include:

1. Televisions & monitors
2. Computers, laptops & accessories
3. Printers
4. Telephones, cell phones & wireless devices
5. Fax machines & scanners
6. Audio-video playback/recording equipment

- Collection will begin by Feb 2008 (items 1 - 3) & Feb 2009 (items 4 - 6)
  - Atlantic Canada Electronics Stewardship (ACES) will oversee electronics stewardship
  - Resource Recovery Fund Board will manage program logistics (paint, tire, bottle experience)
  - Brandowners must implement an approved program to manage e-waste
  - Retailers must provide program information for consumers at point-of-sale
  - Product levies will be used to cover program costs (not sent to government)
  - 33 drop off sites each serving a 30 km radius & 1 consolidation site to be ready by launch date
  - Aligning programs to create social & economic opportunities for persons with disabilities
  - Product levies will be consistent with Alberta (i.e. $5 - $45 CDN)

Manitoba will likely be next…



- Draft regulations mandate e-waste collection (finalization by Jan 2008)
  - *Draft Electrical & Electronic Equipment Stewardship Regulations*
- Proposed designated products include:
  1. Televisions & monitors
  2. Computers, laptops & accessories
  3. Printers
  4. Telephones, cell phones & PDAs
  5. Audio-video equipment (including stereos & cameras)
  6. Microwaves, fax machines & rechargeable batteries
- Collection program is anticipated by 2009 (phased implementation)
  - Industry will have 4 months to submit a plan following promulgation
  - 10 recyclers / resellers identified in Manitoba
  - Goal to establish comprehensive, permanent collection infrastructure
  - Will likely follow an approach similar to other western provinces
  - Ongoing discussions with industry
- 3-month interim round-up for e-waste (summer 2007)
  - Collected designated products from residents (300 tonnes) & schools (250 tonnes)
  - 19 collection points across the province, servicing 6 regions
  - Cost was $550,000 CDN ($1 per kilogram)

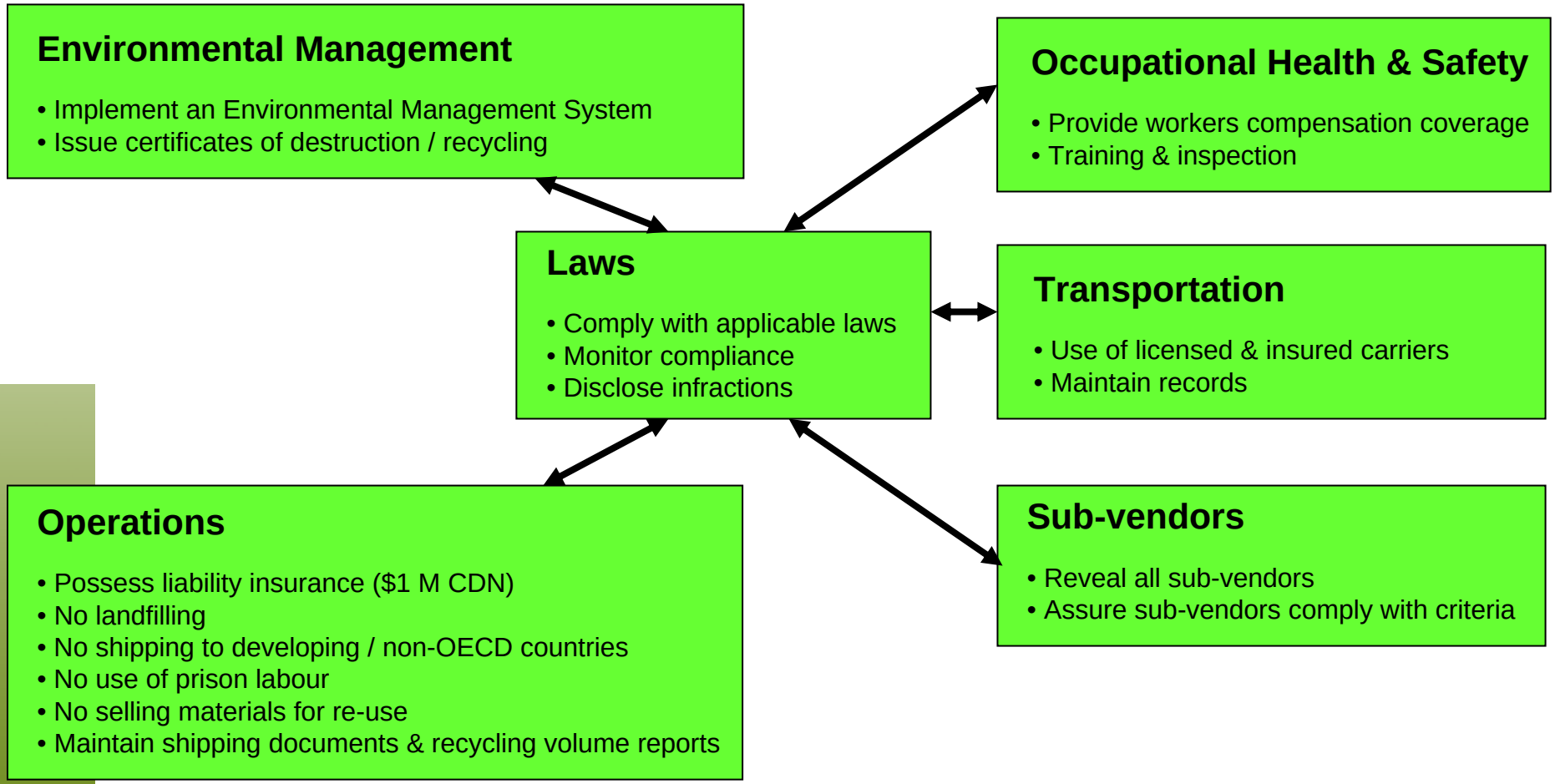
The Canadian electronics industry has been supportive along the way…

- Industry leaders participate through their respective trade associations
  - Information Technology Association of Canada (ITAC)
  - ElectroFederation Canada (EFC)
- Electronic Product Stewardship Canada (ESPC) formed in Mar 2003
  - Now represents the principal vehicle for industry engagement
  - Members include major manufacturers

1. Apple
2. Brother
3. Canon
4. Dell
5. Hewlett-Packard
6. Hitachi
7. IBM
8. Lenovo
9. Lexmark
10. LG Electronics
11. Logitech
12. Microsoft
13. Mind Computers
14. Northern Micro Inc.
15. Panasonic
16. Philips
17. Samsung
18. Sharp
19. Sony
20. Thompson Multi-media
21. Toshiba

- Led Canadian delegation to Belgium, Netherlands & Sweden (Jun 2003)
- EPSC National Model for E-waste Stewardship (2003)
- Recycling Vendor Qualification Standard (2003 & subsequent revisions)
- EPSC pilot with Industry Canada's Computers for Schools program (2004)
- Designing for Environment publication (2006)

…& an EPSC recycling vendor qualification standard is being used by provinces



Observations & lessons learned…

- Identify the current situation in your country (gather baseline information)
  - Types & quantities of e-waste generated
  - Final disposition of e-waste generated (e.g. recycled versus disposed)
  - Existing laws applicable to the management of e-waste
  - Existing infrastructure used to recycle e-waste
- Establish partnerships to help drive the e-waste agenda
  - Relevant government authorities
  - National industry associations & retailer associations
  - Others as appropriate (e.g. ENGOs, NGOs, academia…)
- Prioritize activities to tackle the e-waste problem
  - Collection for environmentally sound management (ESM)
  - Others?
    - Infrastructure development, knowledge transfer
    - Waste reduction, green procurement
    - Reduced hazardous substance content s found in e-products for country sale
    - Data security, employment growth

Observations & lessons learned… (continued)

- Consider collection for environmentally sound management (ESM) first
  - Ancillary benefits from EU, US & Asian restrictions on e-waste content
  - Emergence of “dirty & clean” electronic product streams is unlikely
- Clearly define e-waste & clarify the scope of products for inclusion
  - Televisions & computers are usually addressed first
  - Broaden product scope using a phased-in approach
- Extended Producer Responsibility (EPR) versus Product Stewardship?
  - EPR is often preferred but manufacturers may not exist in some countries
  - Responsibilities may also be imposed upon first importers & first sellers
  - Product stewardship often entails continued government financial support
- Voluntary versus mandatory approaches?
  - Large number of players involved in the manufacture & sale of e-products
  - Free-riders may emerge & jeopardize the success of voluntary approaches
  - Industry & business leaders often request laws to level the playing field

Observations & lessons learned… (continued)

- EPR programs place an obligation upon producers to design programs
  - Industry often meet EPR responsibilities in a collective fashion
  - Government authorities typically approve programs before implementation
- Curbing the disposal of e-waste relies on consumer participation
  - Ensure reasonable & convenient access to collection facilities
  - Do not impose fees to drop off e-waste at collection facilities
  - Take-back programs should include a strong communications component
  - Consider the use of incentives to encourage consumers to return e-products
- Utilize “ESM-compliant” service providers to manage e-waste
  - Develop & implement standards for environmentally sound management
  - Includes operating in accordance with applicable domestic & international law
  - Verify that service providers meet standards & register them with the program
  - Periodically inspect service providers to assure ongoing conformity

Observations & lessons learned… (continued)

- Programs should possess realistic, timely & meaningful targets
  - Performance measurement is gaining an increasing amount of attention
  - Need indicators to determine how much of the potential risk is effectively managed
- Transparency is a critical aspect of program design & implementation
  - Identify interested stakeholders & consult with them along the way
  - Annual public reports should be made available
  - Use third-party verified performance & financial statements (e.g. certified auditors)
- Clarify rules governing the allocation of program revenue
  - Use revenues for their intended purpose (e.g. offset costs of program delivery)
  - Typically used to offer financial incentives to collectors & recyclers
  - Avoid cross subsidization of product streams
- Programs should account for historical & orphan e-waste
  - Consumers will not differentiate
  - This quantity could be significant during the initial stages of program implementation

THANK YOU